

**REMARKS**

At the time of the Office Action dated January 13, 2004, claims 6-10 and 12-22 were pending.

In this Amendment, claims 6-9, 13-16, 19, 20 and 21 have been amended, and claims 10, 12, 17 and 18 have been canceled. Care has been exercised to avoid the introduction of new matter. Specifically, Applicants have amended claim 6 to include the limitation recited in claim 10. Claim 13 has been amended to be in independent form based on claims 12 and 17, and claim 14 has been amended to be in independent form based on claims 12 and 18. The limitations recited in original claims 10, 17 and 18 have been revised in adding them to claims 6, 13 and 14, respectively. Applicants have also revised claims 7 and 19, and added an additional limitation to claim 21. Adequate descriptive support for the revisions and the additional limitation can be found on, for example, page 15, line 23 to page 16, line 2 of the specification. In addition, claims 6-9, 13-16, 20, 21 and 22 have cosmetically been revised for better form.

**Claims 6-10 and 19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hsieh et al. in view of the applications admitted prior art ("AAPA") in the instant application and DeBoer et al.**

In the statement of the rejection, the Examiner asserted that it would have been obvious to modify Hsieh's method based on the teachings of AAPA and DeBoer et al. to arrive at the claimed invention.

It is well established that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Based on this Amendment, Applicants submit that the proposed

combination of Hsieh et al., AAPA and Deboer et al. does not teach or suggest a semiconductor device containing all the limitations recited in claims 6, 7 and 19. The rejection of claim 10 has been rendered moot by the cancellation of the claim. As mentioned above, Applicants have amended claims 6, 7 and 19 to recite the limitation “said method for producing a semiconductor device is performed such that the inner wall of the cylindrical portion having the roughened outer wall remains in a form of said amorphous silicon.”

With respect to the inner wall of the cylindrical portion, the Examiner asserted as follows:

However, at the moment of the roughening of the outer wall of the capacitor, the inner wall is constituted by amorphous silicon (DeBoer et al., column 5, lines 26-65). Furthermore, the claim is open to other limitations such as rendering the amorphous silicon into polysilicon during a downstream process as taught by DeBoer (column 4, lines 19-20) because of the comprising language. (page 12, lines 3-8 of the Office Action)

Applicants understand that the Examiner’s cited portions from DeBoer et al. disclose as follows:

In a preferred aspect of the invention fourth layer 70 constitutes roughened or rugged polysilicon. An exemplary and preferred material for fourth layer 70 is hemispherical grain polysilicon (HSG). Accordingly, layer 70 constitutes a layer comprising rugged polysilicon which is formed over external surface 68 but not over any of internal or inner surface 66. (column 5, lines 29-35 of DeBoer et al.)

Such temperature preferably transforms at least the outermost portion of the silicon seeds and immediately adjacent and previously-formed amorphous silicon of layer 54 into polysilicon. The remaining amorphous silicon can be transformed to polysilicon during the HSG formation, or such can be rendered into polysilicon at a subsequent downstream processing step.(emphasis added)(column 5, lines 59-65 of DeBoer et al.)

It is Applicant’s understanding that the Examiner admitted that DeBoer et al. teaches that the amorphous silicon is transformed into polysilicon during a downstream process. As a result, the layers 68 and 70 of DeBoer et al. (see Fig. 9) do not ultimately have any portion in a form of amorphous silicon.

On the other hand, in the claimed invention, processes are performed such that the inner wall of the cylindrical portion having the roughened outer wall remains in a form of amorphous silicon. Applicants submit that the method including this limitation is not taught or suggested by DeBoer et al. as well as Hsieh et al. and AAPA.

Thus, Hsieh et al., AAPA and DeBoer et al., even if the combination is assumed to be proper, do not teach or suggest each and every limitation of claims 6, 7 and 19. Applicants, therefore, solicit withdrawal of the rejection of claims 6, 7 and 19.

Applicants also note that if an independent claim is nonobvious under 35 U.S.C. §103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Accordingly, as claims 6 and 7 are patentable for the reasons set forth above, it is submitted that dependent claims 8 and 9 which respectively depend from claims 6 and 7 are also patentable. The Examiner's additional comments with respect to the claims do not cure the argued fundamental deficiencies of the proposed combination of Hsieh et al., AAPA and DeBoer et al. Applicants respectfully solicit withdrawal of the rejection of claims 8 and 9.

**Claims 12 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Hsieh et al. in view of AAPA and Dennison et al.**

The rejection of claim 12 have been rendered moot by cancellation of the claim.

**Claims 13-18 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hsieh et al. in view of AAPA and Dennison et al., and further in view of DeBoer et al.**

In the statement of the rejection, the Examiner asserted that it would have been obvious to modify Hsieh's method based on the teachings of AAPA, Dennison et al. and DeBoer et al. to arrive at the claimed invention.

In response, Applicants have amended claims 13 and 14 to be in independent form including the recitation of now cancelled claim 12. Applicants have also included the limitation recited in claim 17 into claim 13 and the limitation recited in claim 18 into claim 14. As a result, both claims 13 and 14 recite the limitation "said method for producing a semiconductor device is performed such that the inner wall of the cylindrical portion having the roughened outer wall remains in a form of said amorphous silicon," similar to claims 6 and 7.

In rejecting claims 17 and 18, now included in claims 13 and 14, respectively, the Examiner cited DeBoer et al., asserting that "the inner wall having a roughed outer wall was originally constituted by amorphous silicon..." (emphasis added) (see page 8, lines 3-4 of DeBoer et al.). Applicants understand that the Examiner intended to argue that the amorphous silicon is transformed into polysilicon during a downstream process.

However, Applicants submit that the above interpretation is not viable anymore because Applicants have amended the limitation reciting that the inner wall of the cylindrical portion remains in a form of said amorphous silicon. Therefore, for the reasons set forth above, DeBoer et al., as well as Hsieh et al., AAPA and Dennison et al., does not teach or suggest a method recited in claims 13 and 14. Applicants, therefore, solicit withdrawal of the rejection of claims 13 and 14.

Applicants also note that as claims 13 and 14 are patentable for the reasons set forth above, it is submitted that dependent claims 15 and 16 which respectively depend from claims 13 and 14 are also patentable. *In re Fine, supra*. The Examiner's additional comments with respect

to the claims do not cure the argued fundamental deficiencies of the proposed combination of Hsieh et al., AAPA, Dennison et al. and DeBoer et al. It is also noted that the rejection of claims 17 and 18 has been rendered moot by cancellation of those claims. Therefore, Applicants respectfully solicit withdrawal of the rejection of claims 15-18.

**Claims 20-22 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hsieh et al. in view of Khamankar et al. and DeBoer et al.**

In the statement of the rejection, the Examiner asserted that it would have been obvious to modify Hsieh et al. based on the teaching of Khamankar et al. and DeBoer et al. to arrive at the claimed invention.

First, Applicants submit that claims 20 and 22 should be allowed because the claims respectively depend on claim 7 and 13 which are patentable for the reason set forth above. The Examiner's comments and citation of Khamankar et al. do not cure fundamental deficiencies of the proposed combination of Hsieh et al., AAPA and DeBoer et al., discussed above.

Second, Applicants have amended claim 21 to include the limitations "said method for producing a semiconductor device is performed such that the inner wall of the cylindrical portion having the roughened outer wall remains in a form of said amorphous silicon," like claims 6, 7, 13 and 14. As discussed above, DeBoer et al. does not disclose that the layers 68 and 70 (see Fig. 9) has an inner wall in a form of amorphous silicon after processes are completed. However, the claimed invention has the inner wall of the cylindrical portion which remains in a form of amorphous silicon. The newly cited reference, Khamankar et al., does not disclose this limitation. Khamankar et al. simply shows that an HSG silicon layer 102 is provided on polysilicon vertical cylinders 104 and polysilicon bases 105, and does not disclose that the HSG

silicon layer 102 includes a portion in a form of amorphous silicon. Thus, Hsieh et al., AAPA, Khamankar et al. and DeBoer et al. do not teach or suggest each and every limitation of claims 21.

Accordingly, Applicants respectfully solicit withdrawal of the rejection of claims 20-22.

**Conclusion.**

Accordingly, it is urged that the application is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Recognition under 37 C.F.R. 10.9(b)

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